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LAUNCH SERVICES PROGRAM

"'Getting CubeSat Missions to Orbit Over the Next Decade"'

27th Annual AIAA/USU Conference on Small Satellites

2013

Garrett Skrobot

Mission Manager

Launch Services Program

NASA

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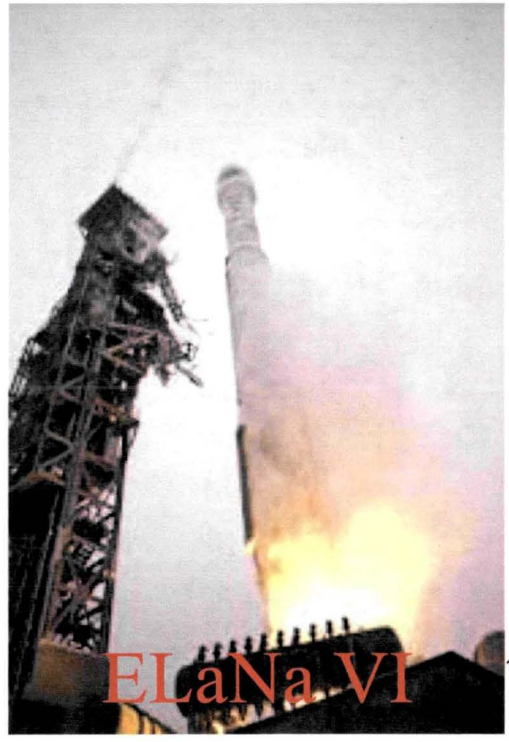
What do we do within LSP for CubeSats?

We Manifest…Integrate…and Launch… CubeSats from the CubeSat Launch Initiative list for NASA

To date we have launched 12 CubeSats



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ELaNa Missions Manifest 2009

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ELaNa Missions Manifest

LV Provider	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
NASA	ELaNa I March 4, 2011 Glory – Taurus 1 PPOD 3 CubeSats	ELaNa III Oct 28, 2011 NPP – DII 3 PPOD 5 CubeSats	ELaNa V Nov 28, 2013 CRS#3 – F9 4 PPODs 5 CubeSats	ELaNa VIII April, 2014 CRS#4 – F9 2PPODs 2CubeSats ELaNa IX Aug 2014 CRS#5 – F9 PPODs 2 CubeSats	ELaNa X Oct 2014 SMAP – DII 3 PPODs 3 CubeSats	ELaNa July 2016 ICESat II – DII 3 PPODs CubeSats	ELaNa Nov 2016 JPSS-1 – DII 3 PPODs CubeSats
NRO			ELaNa VI Sept 13, 2012 NROL-36– DII 3 PPOD 4 CubeSats	ELaNa II Nov 2013 NROL-39 – AV 2 PPODs 4 CubeSats	ELaNa XI Nov 2014 AFSPC-5 2 PPODs 4 CubeSats ELaNa XII Dec 2014 NROL-55 – AV 2 PPODs 2 CubeSats		
ORS			ELaNa IV NET 9/30/13 ORS-3 4 PPODs 11CubeSats ELaNa VII Oct 2013 ORS-4 1 PPODs 2 CubeSats				
Commercial					ELaNa 2015 PPODs CubeSats	ELaNa 2016 PPODs CubeSats	ELaNa 2017 PPODs CubeSats

Manifested **In Work**

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Developments

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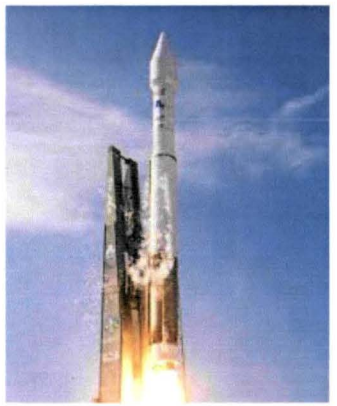
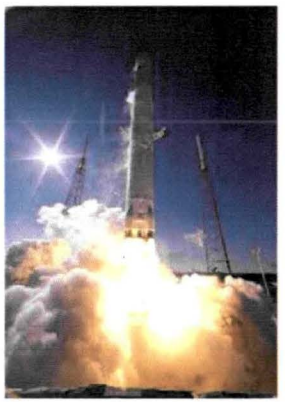
Atlas V		Delta IV	Delta II	Taurus XL	Athena	Falcon 9	
Common	ABC Culite	Common	2nd Stg Struts Section	Aft End 3rd Stg	Aft End	CRS	Fairing
Studied	Flown	Studied	Flown	Flown	Studied	In Development Dec '14	Developing 2014

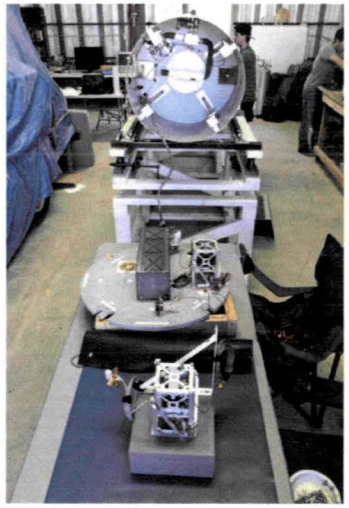
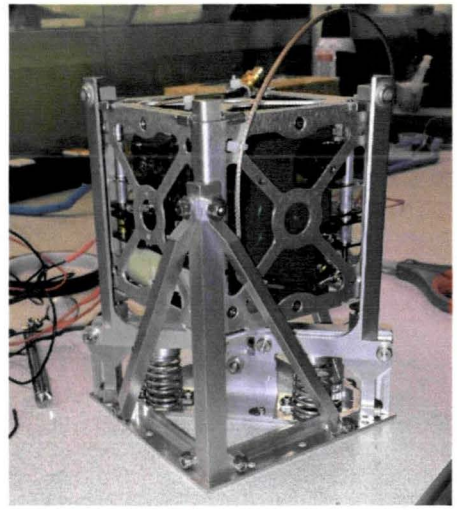
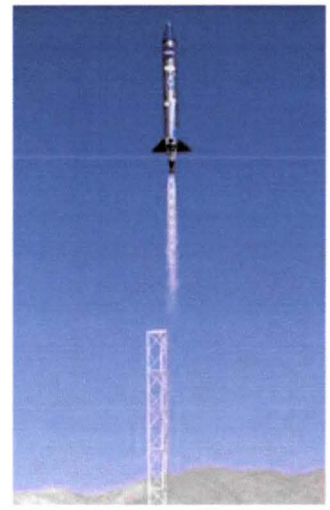




Developments

- **MOOG/CSA ESPA Six U carrier**

- **Tyvak - Nano Launch Carrier System will reduce the mass of the cubesat carrier system for use on future Nano Launch Vehicles**

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CubeSat NanoLaunch

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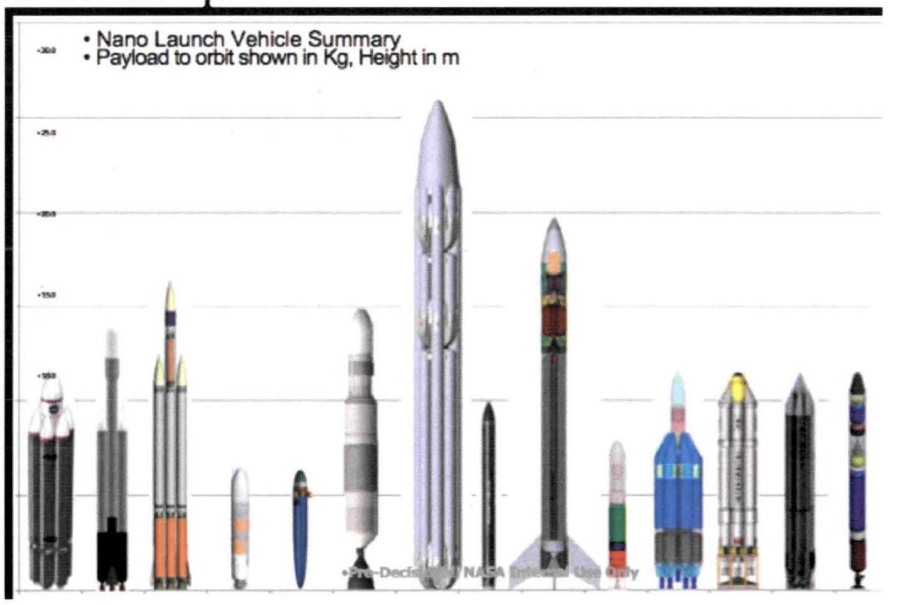
- Launch Services Program working to release an RFP for potential CubeSat-Class Payload launch services
  - Requirement: 15kg (3-3U) to 425km (orbit inclination between 0°-98°)
  - 9/30/13 – 12/15/16 Period of Performance
  - Launch Window: 1/15/16 – 12/15/16
  - Provides for dedicated STEM initiative with multiple contracted P-POD launches
  - Dedicated Nano Launch Vehicle
  - High Risk Tolerant Approach
  - No "first flight" requirement
  - ICD & Mission Success Criteria
  - LSP insight through milestone reviews
  - FAA Licensed Launch



SBIR NanoLaunch Technologies

- **Six contractors are working the 2012 Enhanced Phase I SBIRs in the NanoLauncher technology subtopic**
  - **Tyvak Nano-Satellite Systems LLC**
    - » ***Flexible Low Cost Avionics for NanoSatellite Launch Vehicle Control and GPS Metric Tracking***
  - **Millennium Engineering and Integration Company**
    - » ***Automated Flight Safety Inference Engine (AFSIE) System***
  - **Garvey Spacecraft Corporation**
    - » ***Incremental Evolution of a 10/250 NLV into a 20/450 NMSLV***
  - **Ventions, LLC**
    - » ***Regeneratively-Cooled, Pump-Fed Propulsion Technology for Nano / Micro Satellite Launch Vehicles***
  - **Tethers Unlimited, Inc.**
    - » ***SWIFT-nanoLV Avionics Platform***
  - **Invocon, Inc.**
    - » ***Wireless Intra-vehicle Communication System (WICS)***

Questions